

CLAIMS AMENDMENTS

1. (cancelled).
2. (currently amended) The method as claimed in Claim 4 29, characterized in that further comprising the step of carrying out a bright-field illumination of the cells is carried out apart from in addition to the dark-field illumination, and the step of evaluating the image of the cells further comprises an observation of the brightfield illumination scattered by the cells.
3. (currently amended) The method as claimed in claim 4 29, characterized in that further comprising the step of carrying out an illumination for fluorescent excitation of the cells is also carried out, and the step of evaluating the image evaluation of the cells further comprises an observation of the fluorescent light output scattered by the cells (22).
4. (currently amended) The method as claimed in claim 4 29, characterized in that further comprising the step of carrying out an interference contrast observation of the cells (22) is also carried out, and the step of evaluating the image of the cells further comprises an observation of the interference contrast produced by the cells.
5. (currently amended) The method as claimed in claim 4 29, characterized in that further comprising the step of carrying out a phase constant contrast observation of the cells (22) is also carried out, and the step of evaluating the image of the cells further comprises an observation of the phase contrast produced by the cells.
6. (currently amended) The method as claimed in claim 2, characterized in that wherein differently polarized light of different polarizations is used for various types of the dark-field illumination than for the bright-field illumination, and the images that are produced by the various types of dark-field illumination and by the bright-field illumination are distinguished with the aid of by the different polarizations of the light producing the images.

7. (currently amended) The method as claimed in claim 2, characterized in that wherein light of different wavelengths is used for various types of the dark-field illumination than for the bright-field illumination, and the images that are produced by the various types of dark-field illumination and by the bright-field illumination are distinguished with the aid of by the different wavelengths of the light producing the images.

8. (previously presented) The method as claimed in claim 1, characterized in that the illumination is carried out with pulsed light.

9. (currently amended) The method as claimed in claim 1, characterized in that wherein a sample volume (16) of the culture liquid that is to be imaged is temporarily immobilized during imaging for the purpose of image evaluation.

10. - 28. (cancelled).

29. (new) A method for characterizing the vitality of a culture liquid in a bioreactor comprising the steps of:

- a) illuminating cells contained in the culture liquid by way of dark-field illumination;
- b) analyzing the culture liquid in situ by microscopic imaging of the cells, whereby the microscopic imaging produces an image of the cells;
- c) evaluating the image of the cells by comparing intensities of light scattered by the interiors of the cells and by the edges of the cells as a result of the dark-field illumination, whereby in dark-field illumination the interiors of living cells appear darker than the edges of living cells and the interiors of dead cells appear approximately as bright as the edges of dead cells,
wherein a comparison of the number of living cells to dead cells is made in order to determine the vitality of the culture liquid.

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